TRONOX NAVAJO AREA URANIUM MINES

MINE PRIORITIZATION METHODOLOGY (RISK FACTORS)

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ABOUT THIS METHODOLOGY

The Tronox NAUM Program prioritization process is designed to assist the U.S. Environmental Protection Agency (US EPA) and stakeholders to optimize evaluation of mine sites by providing factors to compare relative human health risks of Tronox NAUM mines. The process uses data collected during the removal site evaluation phase to score five risk factors: radiation level above background; potential migration to surface water; potential impact to groundwater; land-use scenario; and accessibility. Once the five factors are scored, the mines will be grouped as "high," "medium," and "low" risk to assist with the decision-making process.

The primary ranking categories are intended to provide a relative measure of the severity of the human health risks that exist at a given mine. The numerical scores for each factor are less important than the relative high-to-low ranking. This prioritization is used to supplement other lines of information to help the delegated officials with decision-making. It is not a substitute for the CERCLA risk assessment process that is performed during the development of the Engineering Evaluation/Cost Analysis (EE/CA) for removal sites or the Remedial Investigation/Feasibility Study for remedial sites. It also is not related to the National Priorities List (NPL) scoring process.

This process is just one aspect of the evaluation of how Tronox settlement funds will be applied to mines identified in the Tronox settlement. Other factors, such as cost and feasibility of cleanup alternatives that are evaluated during the EE/CA phase, will also be included in the decision-making process. The outcome of the risk prioritization factors serves as a guide to decision-makers and stakeholders and may not reflect actual outcomes.

CERCLA is an iterative process where general information and environmental data is constantly being collected. The scoring factors may be refined as new information and data is reviewed to better define potential risk.

This methodology is designed to help promote a consistent approach for implementation of prioritization of the Tronox NAUM mines. It does not, however, substitute for CERCLA or US EPA's regulations, nor is it a regulation itself. Thus, it does not impose legally binding requirements on US EPA, states, tribes or the regulated community, and may not apply to a particular situation based on the circumstances. US EPA, state, tribal and local decision-makers retain the discretion to adopt approaches on a case-by-case basis that differ from this methodology where appropriate. Any decisions regarding a particular site will be made based on the applicable statutes and regulations.

SCORING FACTOR DESCRIPTIONS

The following factors have been identified to evaluate all Tronox AUMs based on a common set of site risk factors to help guide decisions regarding the expenditure of Tronox resources.

Surface Radiation Level Above Background Investigation Level

Radiation level above site specific background based on surface scans performed during the removal site evaluation of a mine or group of mines.

Potential Migration to Surface Water

Known or potential of contaminated material migrating off-site into a known surface water body (perennial or ephemeral) or proximity of mobile contaminated material to surface water.

Potential Impact to Groundwater

The mine workings are below or at the water table or the mine is within a watershed with known radiological contaminant impacts to ground water.

Land-use Scenario

Potential for the public to live near the site or visit the site for non-residential purposes such as cultural, recreational, agricultural, or grazing.

Accessibility

Ease of gaining access to the site by vehicle or by foot.

GROUPING OF MINE SITES

There may be cases where commingled contamination of mines in close proximity create challenges on determining where contamination from one mine ends and another mine begins. Where that is evident, those mines will be grouped together for scoring purposes.

PRIORITIZATION FACTORS AND SCORING

Surface Radiation Level Above Background Investigation Level

This factor identifies the mean gamma radiation survey results (counts per minute) based on total mine surface scan. Gamma radiation from naturally occuring radioactive materials (NORM) is not included as CERCLA cannot address risk stemming from NORM. Mine sites may not have a homogenous level of gamma radiation. For those sites that do not, it is expected the full extent of contamination will have been identified. From that data, the mean surface radiation level should be used. It will also be noted on the table below the background and the upper and lower radiation levels identified during the removal site evaluation.

Radiation Level Above Background Factor	**Potential Impacts**	**Priority Score**	**Comments and Observations**
Mean gamma radiation survey result for the total disturbed area of the mine is greater than 7x above background	10		
Mean gamma radiation survey result for the total disturbed area of the mine is less than/equal to 7x and greater than 5x above background	8		
Mean gamma radiation survey result for the total disturbed area of the mine is less than/equal to 5x and greater than 3x above background	6		
Mean gamma radiation survey result for the total disturbed area of the mine is less than/equal to 3x and greater than background	4		
Mean gamma radiation survey result for the total disturbed area of the mine is less than/equal to 2x and greater than background	2		
Mean gamma radiation survey result for the total disturbed area of the mine is at or below background	0		
Upper Radiation Level			
Lower Radiation Level			
Background Radiation Level			

Potential Migration to Surface Water

This factor identifies the likelihood of contaminated material migrating off-site into surface water (perennial or ephemeral) or the proximity of mobile contaminated material to surface water. The scoring does distinguish between perennial or ephemeral surface water.

Likelihood Factor	Potential Impacts		Priority Score	Comments and Observations
	Perennial	Ephemeral		
Surface water (perennial or ephemeral) flowing through the site or contaminated material located in a surface water body	10	5		
Mobile contaminated material within 200 feet of surface water (perennial or ephemeral) or surface water (perennial or ephemeral) within 200 feet of disturbed mine waste	8	4		
Mobile contaminated material within 500 feet of surface water (perennial or ephemeral) or surface water (perennial or ephemeral) within 500 feet of disturbed mine waste	6	3		
Mobile contaminated material within 1000 feet of surface water (perennial or ephemeral) or surface water (perennial or ephemeral) within 1000 feet of disturbed mine waste	4	2		
No known or potential for surface water (perennial or ephemeral) to be impacted	0	0		

Potential Impact to Ground Water

The mine workings were below or at the water table or the mine is within a watershed with known radiological contaminant impacts to ground water.

Likelihood Factor	Potential Impacts	Priority Score	Comments and Observations
The mine workings were at or below or at the water table or the mine is within a watershed with known radiological contaminant impacts to ground water.	10		
The mine workings were not below or at the water table or the mine is not within a watershed with known impacts to ground water.	0		

Land-Use

This factor identifies the current or documented future use of the area impacted by the known contamination.

Likelihood Factor	Potential Impacts	Priority Score	Comments and Observations
Current year-round residential use	10		
Transient or potential residential use	6		
Current or potential Cultural/Agricultural/Grazing use	5		
Recreational/Trespasser	2		
Site is completely inaccessible with no land use	0		

Accessibility of Site

This factor identifies how accessible a mine site is to the public.

Likelihood Factor	Potential Impacts	Priority Score	Comments and Observations
Mine is readily accessible from a maintained road using a standard two-wheel drive passenger vehicle or by walking	5		
Not accessible by standard two-wheel drive passenger vehicle; accessible by four-wheel drive vehicle or a utility task vehicle	4		
Mine access requires a moderate hike across relatively flat terrain of less than 1 mile	3		
Mine access requires a hard hike (e.g. heavy vegetation, grade greater than 10% slope, no defined trail, etc.) of greater than 1 mile to access the mine	2		
Site is completely inaccessible	0		

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MINE SCORING EXAMPLE (ACME BR MINE)

This mine scoring example is designed to be at a fictional site for purposes of illustrating the Mine Prioritization Methodology (Risk Factors). Although the photos and figures are from an actual mine, all quantities, measurement, and proposed scenarios are fictitious.

Acme BR mine is located approximately 0.1 miles from the community of Clearwater (Figure 1). For the purposes of this example, the areas, depths, level of contamination have been delineated during the removal site evaluation and the results are summarized and illustrated below:

- The mine areas are accessible from both paved and well-maintained dirt roads.
- The mine workings were below the water table; which was dewatered for mining operations.
- Contaminated material covers approximately 4 to 5 acres. Approximately 5,000 cubic yards is in a roughly 2-yard high pile covering an area 50 yards by 50 yards. Approximately 15,000 cubic yards cover about 4 acres and typically ranges from approximately 1 to 3 feet deep.
- The terrain is slightly sloping with one small drainage feature running through it.
- There is an ephemeral stream running through the site during the monsoon season (July to September).
- During the removal site evaluation, off-road vehicle tracks where noticed, which indicate trespasser activities.
- Nearby residents have a grazing lease and indicated the area is used to graze cattle.
- Background levels for the mine site have been determined to be 9,000 counts per minute.
- Mean gamma radiation for site is 45,000 counts per minute.

Figure 1 – ACME BR Mine
Location Map

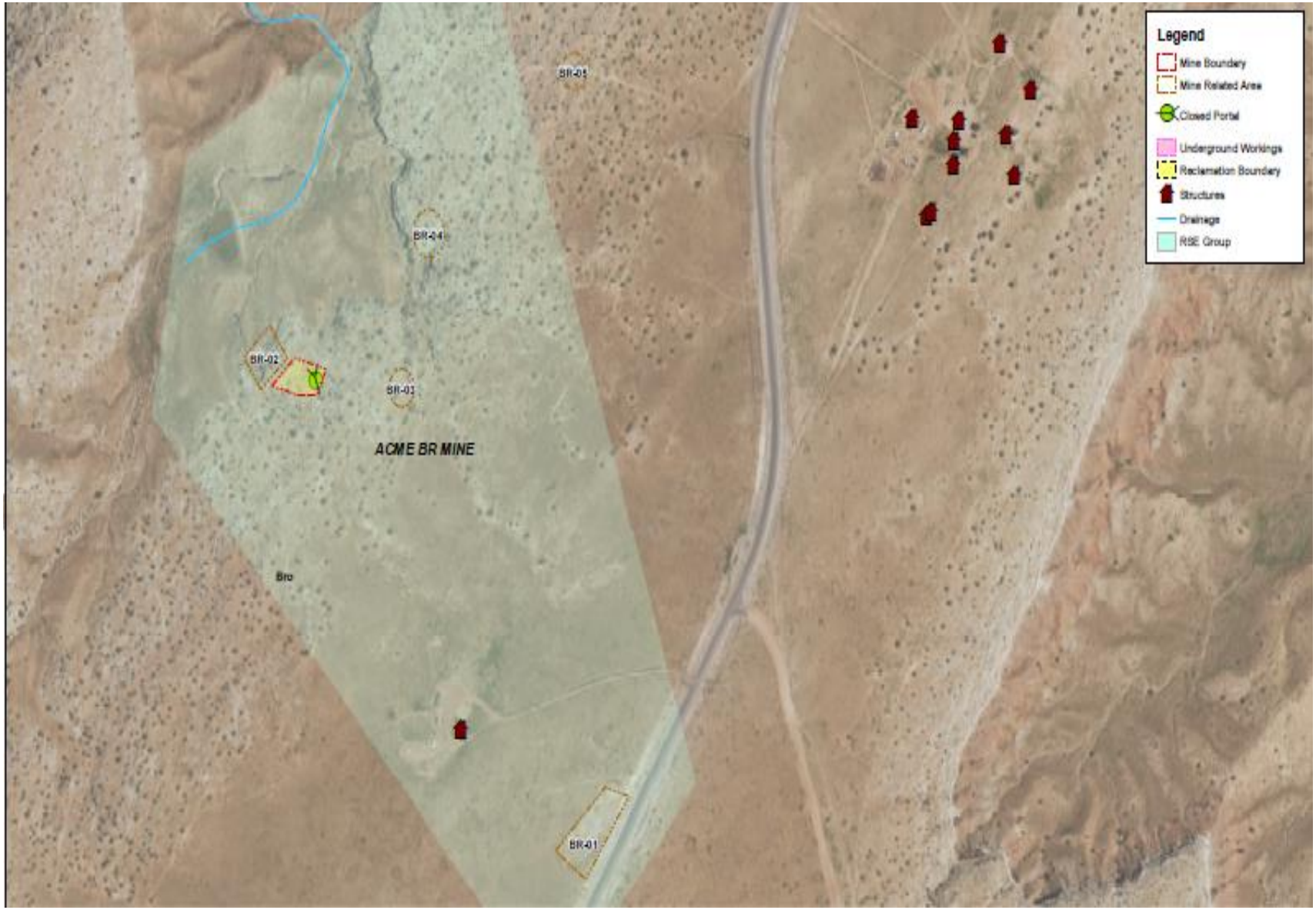

Photo illustrating the topography of Acme BR Mine

Photo illustrating the proximity of housing to the Acme BR Mine

Photo illustrating evidence of trespassers removing the mine reclamation wall

Photo illustrating recreational use (bullet holes)

Acme Mine Prioritization Scoring

Surface Radiation Level Above Background Investigation Level

Radiation Level Above Background Factor	Potential Impacts	Priority Score	Comments and Observations
Mean gamma radiation survey result for the total disturbed area of the mine is greater than 7x above background	10		
Mean gamma radiation survey result for the total disturbed area of the mine is less than/equal to 7x and greater than 5x above background	8		
Mean gamma radiation survey result for the total disturbed area of the mine is less than/equal to 5x and greater than 3x above background	6	6	Mean gamma radiation is 5x background.
Mean gamma radiation survey result for the total disturbed area of the mine is less than/equal to 3x and greater than background	4		
Mean gamma radiation survey result for the total disturbed area of the mine is at or below background	0		
Upper Radiation Level	NA		
Lower Radiation Level	NA		
Background Radiation Level	9,000 counts per minute		

Potential Migration to Surface Water

Likelihood Factor	Potential Impacts		Priority Score	Comments and Observations
	Perennial	Ephemeral		
Surface water (perennial or ephemeral) flowing through the site or contaminated material located in a surface water body	10	5	5	Ephemeral stream flowing through the site.
Mobile contaminated material within 200 feet of surface water (perennial or ephemeral) or surface water (perennial or ephemeral) within 200 feet of disturbed mine waste	8	4		
Mobile contaminated material within 500 feet of surface water (perennial or ephemeral) or surface water (perennial or ephemeral) within 500 feet of disturbed mine waste	6	3		
Mobile contaminated material within 1000 feet of surface water (perennial or ephemeral) or surface water (perennial or ephemeral) within 1000 feet of disturbed mine waste	4	2		
No known or potential for surface water (perennial or ephemeral) to be impacted	0	0		

Potential Impact to Ground Water

Likelihood Factor	Potential Impacts	Priority Score	Comments and Observations
The mine workings were at or below or at the water table or the mine is within a watershed with known radiological contaminant impacts to ground water.	10	10	Mine working were below the water table and the mine was dewatered for operation (wet mine).
The mine workings were not below or at the water table or the mine is not within a watershed with known impacts to ground water.	0		

Land-Use

Likelihood Factor	Potential Impacts	Priority Score	Comments and Observations
Current year-round residential use	10		
Transient or potential residential use	6		
Current or potential Cultural/Agricultural/Grazing use	5	5	Seasonally used for grazing and recreation.
Recreational/Trespasser	2		

Accessibility

Likelihood Factor	Potential Impacts	Priority Score	Comments and Observations
Mine is readily accessible from a maintained road using a standard two-wheel drive passenger vehicle or by walking	5	5	Mine is readily accessible from a paved road.
Not accessible by standard two-wheel drive passenger vehicle; accessible by four-wheel drive vehicle or a utility task vehicle	4		
Mine access requires a moderate hike across relatively flat terrain of less than 1 mile	3		
Mine access requires a hard hike (e.g. heavy vegetation, grade greater than 10% slope, no defined trail, etc.) of greater than 1 mile to access the mine	2		

Possible Prioritization Score = 45

Acme BR Mine Score = 31